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EXAMINER	
ABRAHAM, AMJAD A	

ART UNIT	PAPER NUMBER
1791	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,233	TUMA, JAN	
	Examiner	Art Unit	
	AMJAD ABRAHAM	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 February 2009* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *04/26/2006 and 02/11/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Applicant's remarks and amendments, filed on February 11, 2009, have been carefully considered. Claims 1-9 have been canceled by applicant and claims 10-45 have been added. Therefore claims 10-45 are now pending.

Information Disclosure Statement

1. Examiner withdraws the objection to the Information Disclosure Statement as stated in the previous office action dated October 6, 2009, due to applicant's submission of an IDS.

New grounds of rejections based on applicant's amendments dated February 11, 2009

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 10, 17-18, 22 and 29-30 rejected under 35 U.S.C. 102(b) as being anticipated by Fearing et al. (US Pre-Grant Publication 2003/0208888).

4. Regarding claims 10 and 22, Fearing teaches a process for making adhesion microstructures onto a substrate. **(See abstract and paragraph 0020 and 0113-0117)**.

a. Comprising the steps of:

i. Introducing plastic material into a shaping element (Imprinting). **(See paragraph 0020 and 0113-0117)**.

ii. Forming the substrate into adhesion microstructures (array of probes or stalk). **(See paragraph 0012, 0016, 0021, and 0026)**.

iii. Wherein the adhesion is primarily by intermolecular forces (van der waals forces). **(See paragraph 0012, 0017, 0061 and claim 4 and claim 37)**.

iv. Wherein the end of the protrusions (microstructures) have flat end surfaces. **(See paragraphs 0015, 0051 and claim 12)**.

b. With Respect to claim 10, Fearing teaches wherein the adhesive microstructures can have an end which is flared. **(See figure 1 showing the end part widening and claim 12)**.

c. Additionally regarding claim 22, Fearing teaches wherein the ends can have convex end surfaces (curved segment of a sphere). **(See claim 12)**.

5. Regarding claim 17-18 and 29-30, Fearing teaches wherein the microstructures can be at an angle of 50-75 degrees. **(See paragraph 0018)**

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 10-11, 17-23, 29-35, and 41-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fearing et al. (US Pre-Grant Publication 2003/0208888) in view of Poulakis et al. (Wipo Publication WO 02/091870 A1).

9. **Examiner is using Poulakis et al. (USP No. 7,445,741) as an English language equivalent for WO 02/091870 A1)**.

10. Regarding claims 10 and 22, Fearing teaches a process for making adhesion microstructures onto a substrate. **(See abstract and paragraph 0020 and 0113-0117)**.

d. Comprising the steps of:

v. Introducing plastic material into a shaping element (Imprinting).

(See paragraph 0020 and 0113-0117).

vi. Forming the substrate into adhesion microstructures (array of probes or stalk). **(See paragraph 0012, 0016, 0021, and 0026)**.

vii. Wherein the adhesion is primarily by intermolecular forces (van der waals forces). **(See paragraph 0012, 0017, 0061 and claim 4 and claim 37)**.

viii. Wherein the end of the protrusions (microstructures) have flat end surfaces. **(See paragraphs 0015, 0051 and claim 12)**.

e. With Respect to claim 10, Fearing teaches wherein the adhesive microstructures can have an end which is flared. **(See figure 1 showing the end part widening and claim 12)**. In the alternative, if the widening ends disclosed in Fearing are not interpreted as flared ends, Poulakis teaches the making of adhesion elements which have flared ends. **(See figures 3-4)**.

ix. Poulakis shows a known method for using shaping elements for making adhesion elements with flared ends. The making of flared ends is useful for intended uses where the contacting surface is not smooth (for example wherein a contacting surface is other flared ends). The flared ends can give additional contact surface area plus additional mechanical adhesion support as the flared ends can grab on to one another. Therefore, it would have been obvious for one having the ordinary skill in the art to try flared ends in uses in which smooth surfaces are not used as the contacting surface.

f. Additionally regarding claim 22, Fearing teaches wherein the ends can have convex end surfaces (curved segment of a sphere). **(See claim 12)**.

11. Regarding claims 11, 23, and 35, Fearing teaches the use PDMS (silicone rubber) or polyurethane as plastic material which can be used in formation of microstructures. **(See Column 6 lines 37-43 and column 11 lines 45-53)**.

12. Regarding claims 19-20 and 31-32, Fearing does not explicitly teach: (1) wherein the adhesion elements have stem parts with a height from 50 micrometers to 150 micrometers and with a diameter from 10 micrometers to 40 micrometers and have flared ends with a diameter from 15 micrometers to 70 micrometers and (2) wherein the height of the stems is approximately 90 micrometers, the diameter is 30 micrometers, and the diameter is 50 micrometers.

g. However, Fearing does teach wherein the shaft has a diameter of 1-500 microns and a diameter of 1-10 micrometers. **(See paragraph 0013)**. With a stalk up to 20 microns.

h. Moreover, Fearing does teach wherein making adhesive microstructures, one having the ordinary skill in the art would seek to optimize: (1) the size of the microstructures; (2) the stiffness of the microstructures; (3) the adhesive force (Fo); and (4) the packing density of the microstructures. **(See paragraphs 0072-0077)**. Adjusting the size of the microstructures is done to adjust the adhesion strength and the packing density and would be optimized by one having the ordinary skill in the art.

13. Regarding claim 17-18 and 29-30, Fearing teaches wherein the microstructures can be at an angle of 50-75 degrees. **(See paragraph 0018)**

14. Regarding claims 21 and 33, Fearing teaches wherein the polymer microstructures are cured. **(See paragraph 0115)**.

i. Depending on the material chosen such as a thermosetting elastomer, it would be obvious to harden the material by crosslinking and curing the material.

15. Regarding claim 34, Fearing teaches a process for making adhesion microstructures onto a substrate. **(See abstract and paragraph 0020 and 0113-0117)**.

j. Comprising the steps of:

x. Introducing plastic material into a shaping element (Imprinting). **(See paragraph 0020 and 0113-0117)**.

xi. Forming the substrate into adhesion microstructures (array of probes or stalk). **(See paragraph 0012, 0016, 0021, and 0026)**.

xii. Wherein the adhesion is primarily by intermolecular forces (van der waals forces). **(See paragraph 0012, 0017, 0061 and claim 4 and claim 37)**.

xiii. Wherein the end of the protrusions (microstructures) have flat end surfaces. **(See paragraphs 0015, 0051 and claim 12)**.

k. With Respect to claim 34, Fearing teaches wherein the adhesive microstructures can have an end which is flared. **(See figure 1 showing the end part widening and claim 12)**. In the alternative, if the widening ends disclosed in

Fearing are not interpreted as flared ends, Poulakis teaches the making of adhesion elements which have flared ends. **(See figures 3-4)**.

xiv. Poulakis shows a known method for using shaping elements for making adhesion elements with flared ends. The making of flared ends is useful for intended uses where the contacting surface is not smooth (for example wherein a contacting surface is other flared ends). The flared ends can give additional contact surface area plus additional mechanical adhesion support as the flared ends can grab on to one another. Therefore, it would have been obvious for one having the ordinary skill in the art to try flared ends in uses in which smooth surfaces are not used as the contacting surface.

l. With respect to claim 34, Fearing does not teach wherein the flared ends have surfaces with concavity.

m. However, Poulakis teaches wherein recesses or cavities can be formed on the flared ends. **(See figure 3 and column 5 lines 20-28)**.

xv. It is known in the art that calendering rolls or embossing rolls can impart many shapes during an imprinting operation. Combining this with the fact that Fearing teaches end parts which can include many spherical shapes, it would have been obvious to one having the ordinary skill in the art to try a concave shape.

16. Regarding claims 41-42, Fearing teaches wherein the microstructures can be at an angle of 50-75 degrees. **(See paragraph 0018)**

17. Regarding claims 43-44, Fearing does not explicitly teach: (1) wherein the adhesion elements have stem parts with a height from 50 micrometers to 150 micrometers and with a diameter from 10 micrometers to 40 micrometers and have flared ends with a diameter from 15 micrometers to 70 micrometers and (2) wherein the height of the stems is approximately 90 micrometers, the diameter is 30 micrometers, and the diameter is 50 micrometers.

n. However, Fearing does teach wherein the shaft has a diameter of 1-500 microns and a diameter of 1-10 micrometers. **(See paragraph 0013)**. With a stalk up to 20 microns.

o. Moreover, Fearing does teach wherein making adhesive microstructures, one having the ordinary skill in the art would seek to optimize: (1) the size of the microstructures; (2) the stiffness of the microstructures; (3) the adhesive force (Fo); and (4) the packing density of the microstructures. **(See paragraphs 0072-0077)**. Adjusting the size of the microstructures is done to adjust the adhesion strength and the packing density and would be optimized by one having the ordinary skill in the art.

18. Regarding claim 45, Fearing teaches wherein the polymer microstructures are cured. **(See paragraph 0115)**.

p. Depending on the material chosen such as a thermosetting elastomer, it would be obvious to harden the material by crosslinking and curing the material.

19. Claims 12-13, 24-25, and 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fearing et al. (US Pre-Grant Publication 2003/0208888) in view of Poulakis et al. (Wipo Publication WO 02/091870 A1) in view of George et al (USP No. 7,018,496).

20. **Examiner is using Poulakis et al. (USP No. 7,445,741) as an English language equivalent for WO 02/091870 A1)**.

21. Regarding claims 12-13, 24-25, and 36-37, the combination of Fearing/Poulakis does not explicitly teach: (1) wherein the plastic material is thixotropic and has a viscosity of 7,000 to 15,000 mPas measured with a rotary viscosimeter and (2) wherein the viscosity is approximately 10,000 mPas at a shear rate of 10 1/sec.

q. However, Fearing does teach wherein making adhesive microstructures, one having the ordinary skill in the art would seek to optimize: (1) the size of the microstructures; (2) the stiffness of the microstructures; (3) the adhesive force (Fo); and (4) the packing density of the microstructures. **(See paragraphs 0072-0077)**. It is the stiffness of the microstructures that would be altered by changing or altering the viscosity of the plastic material. The stiffer the plastic material the higher he packing density.

r. George further teaches the use of Thixotropic agents or rheoligical modifiers which can be used to adjust the viscosity of adhesive structures. **(See column 13, lines 20-30, disclosing that a thixotropic agent can be added to thermoplastic in order to alter the flexibility of the composition. George does not specifically state the viscosity range. However, it would have**

been obvious to one having ordinary skill in the art at the time of invention to adjust the viscosity of the plastic molding compound in order to create a molding material that is stiff which would lead to increased packing of the adhesive microstructures, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

22. *Claims* 14-15, 26-27, and 38-39 *are rejected under 35 U.S.C. 103(a) as being unpatentable over Fearing et al. (US Pre-Grant Publication 2003/0208888) in view of Poulakis et al. (Wipo Publication WO 02/091870 A1) in view of Full et al (US Pre-Grant Publication 2005/0072509).*

23. **Examiner is using Poulakis et al. (USP No. 7,445,741) as an English language equivalent for WO 02/091870 A1)**.

24. Regarding claims 14-15, 26-27, and 38-39, the combination of Fearing/Poulakis does not explicitly teach: (1) wherein the shaping element is a drum-shaped screen having at least 10,000 mold cavities per cm2 and (2) wherein the shaping element has 16,000 mold cavities per cm2.

s. However, Fearing does teach wherein making adhesive microstructures, one having the ordinary skill in the art would seek to optimize: (1) the size of the microstructures; (2) the stiffness of the microstructures; (3) the adhesive force (Fo); and (4) the packing density of the microstructures. **(See paragraphs 0072-**

0077). It is the packing density of the adhesive microstructures that would be altered by using stiffer microstructures because the stiffer the microstructures the less like the microstructures will adhere to one another and the higher the packing density. The stiffer the plastic material the higher he packing density.

t. Full further teaches the use of an imprinting roller in order to achieve the desired mold cavities per cm2. **(See Figure 11A)**. Nanoimprinting is a well known process for achieving a high number of cavities onto a surface. As Fearing has envisaged such a nanoimprinting process a roller with mold cavities like the one disclosed in Full would be a conventional choice for one having the ordinary skill in the art.

25. *Claims* 16, 28, and 40 *are rejected under 35 U.S.C. 103(a) as being unpatentable over Fearing et al. (US Pre-Grant Publication 2003/0208888) in view of Poulakis et al. (Wipo Publication WO 02/091870 A1) in view of Tuma (DE 100 39 937 A1).*

26. **Examiner is using Poulakis et al. (USP No. 7,445,741) as an English language equivalent for WO 02/091870 A1)**.

27. **Examiner is using Tuma (USP No. 7,198,743) as an English language equivalent for WO 02/13647 A1)**.

28. Regarding claims 16, 28, and 40, the combination of Fearing and Poulakis does not explicitly teach wherein each mold cavity has a hyperboloid shape.

u. However, Tuma teaches wherein the respective mold cavity is made in the manner of a hyperboloid. **(See column 3, lines 30-38, discussing the fact that it is advantageous to make the mold cavities and interlocking means as rotationally symmetrical parts, especially in the form of hyperboloids)**.

v. As Tuma uses a similar roller for a nanoimprinting process that is commonly used to make adhesion elements, it would have been obvious to one having the ordinary skill in the art to use a similar roller to impart a hyperboloid shape. Using a hyperboloid rather than a cylindrical shape will allow the middle of the microstructure to be narrow and help eliminate the microstructures from contacting each other during compression.

Response to Arguments

29. Applicant's arguments filed February 11, 2009 have been fully considered but they are not persuasive and/or moot because of the new rejections.

30. **Applicant's arguments #1:** Applicant has consistently argued that hook and loop fastener art is nonanalogous and would not be relied upon for creating the claimed adhesion elements.

31. Examiner Response #1: Examiner points out that both the Fearing and the Full reference disclose a plastic shaping adhesive microstructure elements that would not be

classified as a typical hook and fastener type of adhesion element. Both fearing and Full disclose the use of nanoimprinting (roller type) to make the adhesion microstructures. As this nanoimprinting technique has been applied to fastener elements, one having the ordinary skill in the art would look to the fastener art as the closest art as well as applying similar molding principles seen in the fastener art. Also the fastener art has some intermolecular interaction (van der waals interaction) that is seen by the applicant's claims. Inherently the shaping elements that close in the fastener art will have some intermolecular forces that help keep the fastener closed.

w. See also Paragraphs 0005-0008 of the Fearing reference disclosing the fact that the uses for adhesion microstructures range from tape uses to fastener uses. Specifically the adhesive mechanism taught by Fearing is creating adhesion microstructures near that of the Gecko. As applicant has claimed similar features it would have been within the skill of one having the ordinary skill in the art to modify the teachings of Fearing with any art that teaches adhesive microstructures on tapes or fasteners in an effort to improve an invention.

Conclusion

32. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMJAD ABRAHAM whose telephone number is (571)270-7058. The examiner can normally be reached on Monday through Friday 8:00 AM to 5:00 PM Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Phillip Tucker can be reached on (571) 272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AAA

/Philip C Tucker/
Supervisory Patent Examiner, Art Unit 1791